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## RECENT LITERATURE.

**The Structure of Solpugids.**—That indefatigable student of the Arachnida Mr. Henry M. Bernard has presented us with a valuable account<sup>1</sup> of the general structure of these little known forms. And yet while we can praise the statement of facts, as a whole, we would point out that the paper contains a number of theoretical points, which have, in our estimation, no sufficient basis.

The Galeodidæ, of which over 50 species have been described, are confined to the warm portions of both hemispheres, and though abundant in certain regions, they are comparatively rare in collections; possibly from the fact that they are, by popular consent, accorded most poisonous qualities. They, alone of all the Archnida, show a distinct "head" while they also have a "thorax" divided into three segments, and these points have led many authors to look upon them as forming a transition between the Archnida and the Hexapods. They also possess stigmata in the thoracic region, a condition only paralleled in the Arachnida in certain of the mites.

In his paper Bernard takes up first the external anatomy and the interesting features here are: the interpretation of the cephalic lobes as the lateral regions of the first segment which have been changed in position with the transfer of the chelicerae; and he further tries to find them in the cephalic lobes of embryos of other Arachnids, a view with very little in morphology to support it. The beak is interpreted as fused labium labrum, neither of these, as the name of the first might imply, being appendicular in nature. The ocular tubercle is regarded as the only remnant of the original dorsal surface of the head, the rest having been displaced by the upward and backward movement of the cephalic lobes; and, from this, the median eyes are regarded as the more primitive, the lateral as secondarily acquired. The descriptions of the limbs, as well as of the apodemalous skeleton affords little to abstract, except that the author suggests that since specialized poison organs are absent the poison may come from setal-pores on the chelicerae; and that, at any rate, the idea of their poisonous nature should not be set aside without further experiment. As little need be said of the account of the hypodermis or of the muscular systems.

The account of the nervous system is disappointing. Although sections were cut (cf., p. 345) no use of them appears to have been made

<sup>1</sup> Trans. Linn. Socy. London, Zool. Vol. vi, pt. 4, 1896.

in the study of the topography of the system and we are left absolutely in the dark as to the presence of ganglia in front of those of the chelicerae; a point of no little importance. The eyes receive hardly more satisfactory treatment, owing to the unsatisfactory condition of the specimens. No vitreous body was found in the median eyes while the retinal cells showed no rods, and no grouping of these into a rhabdem was seen. The lateral eyes vary in size, shape, and arrangement and are described in some cases as having fused on either side of the head, although no evidence is presented of such fusion. The pedipalpal organs, reversible sacs on the tips of these appendages are described in detail and are clearly sensory as are the "racquet organs" on the last pair of thoracic appendages.

The alimentary canal opens by the mouth at the end of the beak, the opening being fringed with a strainer of bristles, while the oesophagus, in front of the oesophageal collar, is modified into a "sucking stomach." The midgut is provided with gland, like diverticula and although they are grouped into those of the cephalothorax and abdomen, all clearly belong to one series, but those of the abdomen are remarkable not only from the number but from the fact that they empty into a collecting duct on either side and these ducts, in turn, empty into the intestines near the base of the abdomen. The Malpighian tubules are well developed and are described as emptying into the midgut, and Bernard accepts the views of Loman that these organs in the Arachnids cannot be homologous with the similarly named structures in the Hexapods. The heart has retained 8 pairs of ostia, while there are indications of another segmental chamber in front. From in front an aorta carries the blood forward and "appears to discharge the blood directly on to the central nervous system. There are no indications of the circumneural vessels like those of the Scorpions and of which Mr. Bernard holds, in some respects, peculiar views.

The respiratory system affords more that is interesting. The observations of previous students that there are three pairs of stigmata (and sometimes a fourth unpaired) is confirmed. Of these the first pair open behind the coxæ of the second pair of legs while the others compare with the anterior pulmonary openings of the Scorpions. Arguing from the conditions of the blood-vessels (and more from his preconceptions of the phylogeny of the respiratory organs Bernard concludes that there were originally two other tracheal openings in the thorax. There then follow some interesting but inconclusive remarks upon the primary number of stigmata in different Arachnids. While dealing with these respiratory structures the author deals with the question of

the origin of tracheæ from lung books (p. 375) and accepts the view that the former were the more primitive, the latter secondary, and reinforces it with the remark that this view "arrived at by comparative morphology, has recently been confirmed by embryology. Janorowski has discovered that the tracheal invaginations of Spiders first from branched tracheal tubes and that the lung books are a secondary specialization." And this without the slightest reference to the results of Simmons (since amply confirmed by Purcell and Brauer) which are directly the reverse. It is to be said in passing that the thoracic stigmata of the Solpugidæ, like those of the Acarina, are the greatest difficulty presented to those who believe in the *Limulus*-Arachnid theory, but the author dismisses the results of Wagner in this connection with the remark "that all conclusions based upon transitional phenomena of single specialized types will have ultimately to be tested by a profounder and more extended comparative study of existing forms."

The coxal glands, naturally have much attention. The external opening occurs between legs 3 and 4, the duct is long and convoluted while the gland itself is described as a great mass of tubules. These organs he is still inclined to think the derivatives of setiparous sacs, a view which "has hitherto met with no favor." Regarding the fact that they may be coelomic in character he merely refers to Lauries observations on the scorpion and says that until this be confirmed the bulk of evidence seems to point to the coxal glands as a blind ending tube. And again (p. 381). "I freely admit that these arguments would have but little weight as against direct embryological evidence, if that evidence were really satisfactory." Certainly the results of Grobben, Kishenonyi, Lebinsky, Kingsley and especially those of Brauer are confirmative of those of Laurie, all showing the coxal glands are derived from the coelomic wall and are the purest of mesoderm (if there be such a layer) and that their external opening is a subsequent formation. For the opposite view, held by Bernard, there seems not the slightest evidence.

After a few remarks upon the genital organs the author presents an attempt to elucidate the phylogeny of the Arachnida, and it is here that we are most at variance with him. It is impossible to go into his argument in detail. It all rests upon the attempt to derive every existing Arthropod structure from structures already present in the annelid ancestor, setiparous sacs apparently playing the most important point. These coxal glands, tracheæ, poison glands, stink glands, spinning glands cement glands, maxillary glands, salivary glands, etc., are all referred

back to the setiparous gland of the annelid; yes further, the hairy bodies of the Solpugids and Mygalidæ are direct inheritances from the annelid setæ. *Scorpio* is not primitive but rather a specialized form. In some of his statements of fact he also seems to be in error. Thus he says (p. 398) "What actual evidence we have as to the character of the abdominal limbs [in the primitive Arachnid] shows that they were filamentous jointed appendages like those on the cephalothorax." On the contrary in Scorpions (cf. Brauer, Patten) which, with all deference to Mr. Bernard, we continue to regard the most primitive of existing Arachnids, they appear in the embryo as flat lamellate limbs. Again (same page) he says that the sensory plates on the pectines of the scorpion are on the ventral and not on the posterior face of the limb. On the contrary they are on the posterior side as the figures of both Patten and Brauer show. But what we have most to criticise is the failure to refer to opposing views or corrections of previous statements. Thus he refers to "stigmatic scars" along the whole length of the abdomen of the Pseudoscorpions, scars which bear another interpretation. He speaks of the entostemite as ectodermal, without stating that a portion of it is mesodermal (Schimkewitsch), while we have referred to other cases above.—J. S. K.

**The Bears of North America.**<sup>1</sup>—A new classification of the bears of North America is proposed by Dr. Merriam. This classification is based on the study of more than 200 skulls, including about 35 skulls of the huge bears of the Alaska coast region. The number of full species recognized by Dr. Merriam is ten: 4 of the Black Bear group; 2 of the Grizzly group; 3 of the big brown bears of Alaska, and the Polar bear. Four of these species are new; (1) the gigantic fish-eating bear of Kadiak Island and the Alaskan Peninsula, *Ursus middendorffii* Merr.; (2) the large brown bear of Yakutat Bay and the coastal slope of the St. Elias Alps, *Ursus dallii* Merr.; (3) the large brown bear of Sitka and the neighboring islands, *Ursus sitkensis* Merr.; and (4) the Florida Black bear, *Ursus floridanus* Merr. The Sonoran Grizzly and the Norton Sound Grizzly are considered as subspecies only. The Alaskan bears fall into 2 distinct groups. (1) *U. sitkensis* and *U. dallii*, which resemble the Grizzlies in the flatness of their skulls, but are larger and differ from them in color and dentition; and (2) *U. middendorffii* which differs markedly from all other American types, and closely resembles the Great Brown Bear of Kamschatka. Merriam's synopsis is illustrated by figures of the skulls of the different species.

<sup>1</sup> (Proceeds. Biol. Soc., Washington, April, 1896.)